

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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| Applicant's or agent's file reference C02045WO | FOR FURTHER ACTION See Form PCT/IPEA/416 | |
| International application No. PCT/EP2003/013927 | International filing date (day/month/year) 09 December 2003 (09.12.2003) | Priority date (day/month/year) 23 December 2002 (23.12.2002) |
| International Patent Classification (IPC) or national classification and IPC C09K 11/00 | | |
| Applicant COVION ORGANIC SEMICONDUCTORS GMBH | | |

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| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input type="checkbox"/> (<i>sent to the applicant and to the International Bureau</i>) a total of _____ sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (<i>sent to the International Bureau only</i>) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p> <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input checked="" type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input checked="" type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p> |
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| Date of submission of the demand 16 July 2004 (16.07.2004) | Date of completion of this report 02 September 2005 (02.09.2005) |
| Name and mailing address of the IPEA/EP | Authorized officer |
| Facsimile No. | Telephone No. |

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.

- This report is based on translations from the original language into the following language _____, which is language of a translation furnished for the purpose of:
- international search (under Rules 12.3 and 23.1(b))
 publication of the international application (under Rule 12.4)
 international preliminary examination (under Rules 55.2 and/or 55.3)

2. With regard to the elements of the international application, this report is based on (replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):

- The international application as originally filed/furnished

the description:

pages _____ 1-25 _____, as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

the claims:

pages _____ 1-16 _____, as originally filed/furnished
 pages* _____, as amended (together with any statement) under Article 19
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

the drawings:

pages _____, as originally filed/furnished
 pages* _____ received by this Authority on _____
 pages* _____ received by this Authority on _____

a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.

3. The amendments have resulted in the cancellation of:

- the description, pages _____
 the claims, Nos. _____
 the drawings, sheets/figs _____
 the sequence listing (specify): _____
 any table(s) related to sequence listing (specify): _____

4. This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- the description, pages _____
 the claims, Nos. _____
 the drawings, sheets/figs _____
 the sequence listing (specify): _____
 any table(s) related to sequence listing (specify): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

- the entire international application.
- claims Nos. 9, 10, 11 (in part) - 16 (in part)
- because:
- the said international application, or the said claims Nos. _____ relate to the following subject matter which does not require an international preliminary examination (specify):
- the description, claims or drawings (*Indicate particular elements below*) or said claims Nos. _____ are so unclear that no meaningful opinion could be formed (specify):
- the claims, or said claims Nos. _____ are so inadequately supported by the description that no meaningful opinion could be formed.
- no international search report has been established for said claims Nos. 9, 10, 11 (in part) - 16 (in part)
- the nucleotide and/or amino acid sequence listing does not comply with the standard provided for in Annex C of the Administrative Instructions in that:
- the written form has not been furnished
 does not comply with the standard
- the computer readable form has not been furnished
 does not comply with the standard
- the tables related to the nucleotide and/or amino acid sequence listing, if in computer readable form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.
- see Supplemental Box for further details.

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Box No. IV Lack of unity of invention

1. In response to the invitation to restrict or pay additional fees the applicant has:
 - restricted the claims.
 - paid additional fees.
 - paid additional fees under protest.
 - neither restricted nor paid additional fees.
2. This Authority found that the requirement of unity of invention is not complied with and chose, according to Rule 68.1, not to invite the applicant to restrict or pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
 - complied with.
 - not complied with for the following reasons:
4. Consequently, this report has been established in respect of the following parts of the international application:
 - all parts.
 - the parts relating to claims Nos. 1-8, 11 (in part) - 16 (in part)

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(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV.

Lack of Unity of Invention

The Examining Division concurs with the objection raised by the Search Division with regard to a lack of unity of invention (PCT Rule 13.1 and 13.2). The reasons are as follows:

Two groups of inventions were identified:

Invention 1

Claims 1 to 8 and 11 (partial) to 16 (partial)
Organic electroluminescent device containing an emitting layer with a mixture of a hole conductor material and an emission material, containing one or more spiro-9,9'-bifluorene units.

Invention 2

Claims 9, 10 and 11 (partial) to 16 (partial)
Spiro-9,9'-bifluorene compounds of formula (I), as described in claim 9; use of said compounds in organic electroluminescent devices.

For the following reasons, the above inventions are not so linked as to form a single general inventive idea within the meaning of PCT Rule 13.1: The technical feature that links inventions 1 and 2 is the presence of spiro-9,9'-bifluorene units. However, this does not represent the same or a similar special technical feature within the meaning of PCT Rule 13.2, since said feature is already known from the prior art; document WO 02/077060 describes the use of spiro-9,9'-bifluorene

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(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: IV.

compounds in an organic electroluminescent compound. There is therefore no single general inventive idea within the meaning of PCT Rule 13.1, but rather two separate inventions, the first invention being directed to the use of spirobifluorene units in a mixture with an emitting layer of an organic electroluminescent device and the second invention being directed to specific spirobifluorene compounds *per se* of the general formula (I).

Since the applicant has not utilized the possibility of having a search report established for the second invention, the application will be processed on the basis of the invention for which a search has already been conducted, i.e. for the invention that is described first in the claims.

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V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|--------|----------------|
| Novelty (N) | Claims | YES |
| | Claims | 1-8, 11-16 NO |
| Inventive step (IS) | Claims | YES |
| | Claims | 1-8, 11-16 NO |
| Industrial applicability (IA) | Claims | 1-8, 11-16 YES |
| | Claims | NO |

2. Citations and explanations

Reference is made to the following documents:

- D1: WO 02/077060 A (COVION ORGANIC SEMICONDUCTORS; PARHAM AMIR (DE); BECKER HEINRICH (DE)) 3 October 2002 (2002-10-03)
- D2: EP-A-1 220 339 (SEMICONDUCTOR ENERGY LAB) 3 July 2002 (2002-07-03)
- D3: SALBECK J; YU N; BAUER J; WEISSÖRTEL F; BESTGEN H: "Low molecular organic glasses for blue electroluminescence" SYNTHETIC METALS, Vol. 91, 1997, pages 209-215, XP002277588
- D4: WO 02/051850 A (COVION ORGANIC SEMICONDUCTORS; BECKER HEINRICH (DE); DROTT JACQUELINE) 4 July 2002 (2002-07-04)
- D5: SPREITZER H ET AL: "WHITE AND BLUE TEMPERATURE STABLE AND EFFICIENT OLEDs USING AMORPHOUS SPIRO TRANSPORT AND SPIRO EMITTING COMPOUNDS" PROCEEDINGS OF THE SPIE, SPIE, BELLINGHAM, WA, US, Vol. 4105, 31 July 2000 (2000-07-31), pages 125-133, XP008017672 ISSN: 0277-786X

1. Novelty

The present application does not satisfy the requirements of PCT Article 33(1) because the subject matter of claims

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1-8 and 11-16 is not novel within the meaning of PCT Article 33(2).

1.1.

Document D1 discloses (see page 23, lines 19-21 and page 25, paragraphs 3 and 4) a mixture of two spirobifluorenes and their use in various layers of an organic light-emitting device.

1.2.

Document D2 likewise discloses (see paragraphs 0233-0235) a mixture of two spirobifluorenes and their use in various layers of an organic light-emitting device.

2. Inventive Step

The present application does not satisfy the requirements of PCT Article 33(1) because the subject matter of claims 1-8 and 11-16 does not involve an inventive step within the meaning of PCT Article 33(3).

Even if the applicant were to overcome the objections raised with respect to novelty by submitting a set of amended claims, the aforementioned documents D1 and D2 would still be relevant in the evaluation of an inventive step.

Moreover, the content of documents D3, D4 and D5 will also be consulted during the evaluation of any possible inventive step:

Document D3 describes an organic light-emitting device constructed of two layers, said device containing a hole-transporting spirobifluorene compound and an electron-transporting spirobifluorene compound.

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Document D4 describes the use of spirobifluorene compounds in organic light-emitting devices.

Document D5 describes an organic light-emitting device with spirobifluorene compounds: spiro-TAD and spiro-DPVBi (the same compound as in D2).